INTERNAL WAVES ON THE MONTEREY CONTINENTAL SLOPE

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LONGTERM GOAL

My interests are in oceanic phenomena ranging from the meso- to the microscale that contribute to mixing and stirring, with a focus on their interactions. These include internal waves, potential-vorticity-carrying finestructure, turbulence, double diffusion, bottom topography and surface forcing. Parameterization of the impact of "subgridscale" processes on larger scales.

SCIENTIFIC OBJECTIVES

My recent focus has been on understanding how topography interacts with the meso- and finescale flow fields in the surrounding ocean.

APPROACH

Profile measurements of velocity, temperature and salinity collected along the 1000- and 1500-m isobaths of the continental slope outside Monterey Bay as part of ONR's Littoral Internal Wave program (LIWI) will be analysed to quantify the cross-slope internal wave energy-flux <u'p'>. These results will be compared with similar measurements to be collected on the New England continental slope in spring 1998.

WORK COMPLETED

XCP and XCTD profiles were collected during a joint ONR/NSF cruise with Drs. Mike Gregg (APL-UW) and Leslie Rosenfeld (NPS) in August 1997 to examine the internal wave and turbulence climates on the continental slope and in the submarine canyon. Three continental slope topography regimes were sampled: a major canyon, an ancient river fan, small gullies and ridges and smooth. Measurements extended from the surface to the bottom. Processing of the data has been started.

RESULTS

The dominant signal in data collected along the 1000-m isobath was a 50 cm/s equatorward California Undercurrent with its strongest signal between 100-200 m. Along the 1500-m isobath, the undercurrent was much weaker (< 10 cm/s) and the strongest signal was downward-propagating near-inertial waves. As these waves were on the warm, negative-vorticity side of the current, they are likely vorticity-trapped waves. The cross-slope wave signals will require analysis to pull out.

IMPACT/APPLICATION

If the cross-slope internal wave energy-flux <u'p'> can be quantified with these measurements it will provide a means of remotely assessing the energy available for turbulent dissipation and mixing on the shelf, and will address the question of whether the shelf and continental slope are sources or sinks of open-ocean internal waves, in particular, the internal tide.

TRANSITIONS

Work related to my abyssal and topographically-intensified turbulent mixing was cited in Science by Kerr (1997).

RELATED PROJECTS

The results found outside Monterey Bay will be compared with similar ONR-funded measurements that I will be collecting along the New England continental slope during spring 1998, also as part of LIWI. This work will be in collaboration with Drs. Kurt Polzin, John Toole and Ray Schmitt (WHOI).